LOG-HC2

Universal datalogger with LCD screen

User manual

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Document releasesw

Doc. Release	Date	Notes
_00	28.11.2011	Original release

User manual

rotronic LOG-HC2

Operating instructions

PC software

Setup

Reader

Viewer

Online

Utility programs

Additional software for PCs

Important notes regarding this user manual

In this manual notes of particular importance are presented as follows:

WARNING	Indicates that equipment may suffer damage or that there is a risk of injury to the operator or user should the instructions not be followed correctly.
CAUTION	Indicates that equipment may suffer damage or that data loss may occur should the instructions not be followed correctly.

Conventions

Term / Symbol	Description	Example
Logger	In this manual the term "logger" is used to mean both "LOG-HC2-RO1" and "LOG- HC2-P1".	
Commands, programs, menu items, functions, field names	Commands, programs, menu items, functions, field names are shown in **bold**.	**Record**
->	See page	-> 5
	• Reference to further information • Further information	

Safety instructions and warnings

WARNING

- Read the operating instructions carefully before using the logger or the logger software. This will protect you personally and avoid damage to the unit.
- The logger is a unit for recording and displaying measurement parameters and may not be used for safety-related applications.
- Before using the logger check the unit itself and all cables for visible signs of damage and never operate a damaged logger. A damaged logger can endanger operator safety! Should the logger not function perfectly or appear to be damaged, send it to Rotronic for repair.
- Ensure that no fluids enter the logger's casing. Fluids cause corrosion damage and short-circuits inside the logger.
- The logger must never be opened or modified. The manufacturer cannot be held liable for damage resulting from use other than that for which the unit is intended, or from improper operation of the unit.
- Never use a logger with a leaking battery. Should a battery leak be detected ensure that the electrolyte does not come into contact with the skin, the eyes or the mouth. Should this occur, thoroughly rinse the affected area with water for at least 15 minutes. Consult a doctor. Do not breathe in any vapours emitted. Immediately clean the electrolyte from the logger using a soft cloth and dispose of the cloth subsequently.

CAUTION

- Ensure the proper disposal of an obsolete logger and USB connection cable ->17.

Instructions

Operating Instructions

LOG-HC2-RO1

LOG-HC2-P1

Overview

The logger is a miniaturised universal datalogger for measuring and recording different physical measurement parameters.
For further information, see data sheets.

The Logger PC program enables users to customise the way in which the logger measures and records data according to their requirements. The integrated clock (RTC) allows data from as many loggers as required to be synchronised and merged into a single data record.

LOG-HC2-RO1

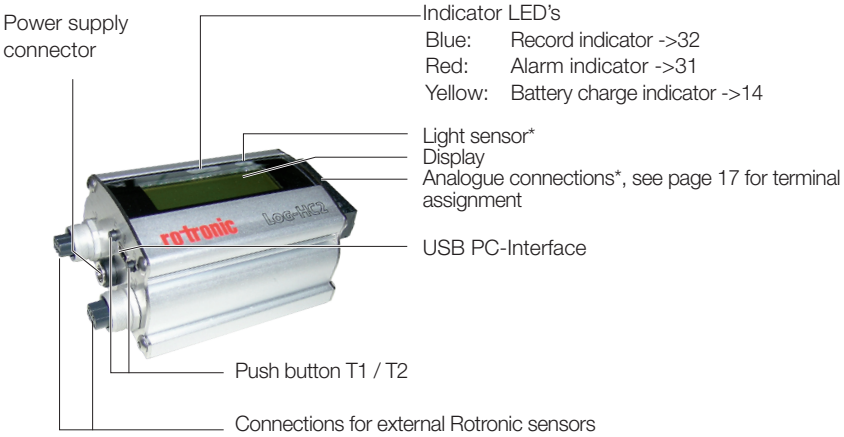
LOG-HC2-P1

USB connection cable

CD with LOG software

Mains adapter

Controls



*LOG-HC2-RO1 only

Turning the unit on / saving measurement parameters

The storage properties of the logger are determined using the **Setup** program*. Control of measurement parameter storage can be either time activated, value activated or by pushing the push button.

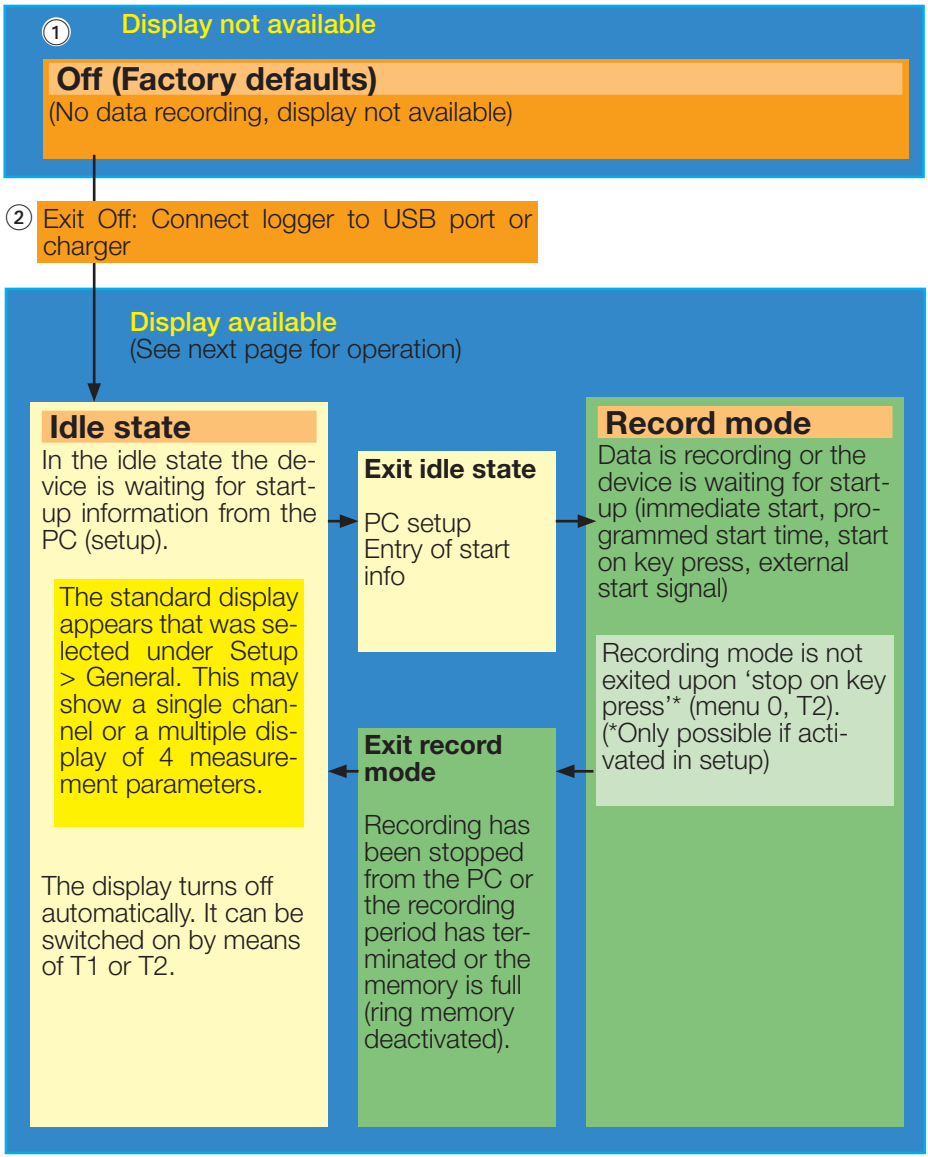
See also chapter „Logger display / Logger operation“ on page 12.

*__Setup__ is an LOG PC program (see below).

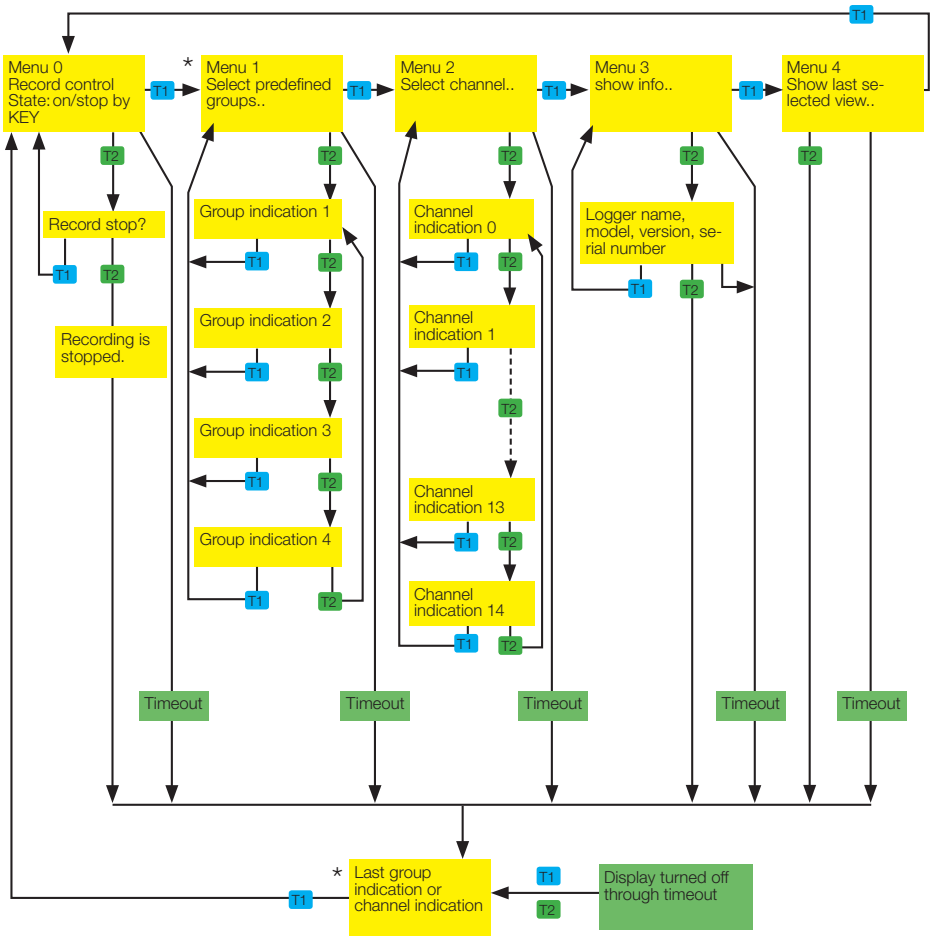
Logger display / Logger operation

When the logger is turned off ① the display cannot be activated using the T1 or T2 keys. The display and keys are activated by connecting the logger to a USB port or charger ②. The display is operated using keys T1 and T2 (see the diagram "Display and operation").

Logger states


① Display not available
Off (Factory defaults)
(No data recording, display not available)
② Exit Off: Connect logger to USB port or charger
Display available
(See next page for operation)
Idle state
In the idle state the device is waiting for start-up information from the PC (setup).
The standard display appears that was selected under Setup > General. This may show a single channel or a multiple display of 4 measurement parameters.
The display turns off automatically. It can be switched on by means of T1 or T2.
Exit idle state
PC setup
Entry of start info
Exit record mode
Recording has been stopped from the PC or the recording period has terminated or the memory is full (ring memory deactivated).
Record mode
Data is recording or the device is waiting for start-up (immediate start, programmed start time, start on key press, external start signal)
Recording mode is not exited upon 'stop on key press'* (menu 0, T2). (*Only possible if activated in setup)

Logger display and logger operation



* For defining group indication and channel indication see „Defining the logger display“ on page 39.

Indicator LED's

Information displayed	
LED	**Meaning**
Red	Alarm limit reached
Blue	Define the behaviour of the blue LED via **Setup** > **Basic settings**. See the section Setup, LED behaviour.

Meaning of the yellow lamp during charging	
LED	**Meaning**
yellow continuously	Charging in progress
yellow off	• Fully charged • No connection to PC • PC turned off • Power supply not connected
yellow flashes	Fully charged The battery is recharged for a short time, e.g. during an online measurement or data recording

Maintenance

User checks

- Check the logger before each use.
- Before using the logger check for visible signs of damage.
- Check the functions of the logger.
- Never use a logger that is damaged or not functioning perfectly. Never use damaged accessories.
- Ensure that the battery is sufficiently charged for the required period of use.

Should the logger not function perfectly or should damage become apparent send the unit to Rotronic for repair. Repairs may only be carried out by Rotronic or an authorised dealer. Defective or damaged components may only be replaced with manufacturer's original parts.

Cleaning

CAUTION

- Ensure that no fluids enter the logger's casing. Fluids will cause corrosion damage and short circuits.
- Never use corrosive or abrasive cleaning agents or polishes.
- Cleaning agents containing additives such as alcohol will cause the case to become matt and/or brittle.

- Clean the logger when necessary.
- Always disconnect the logger from the PC or the power supply before cleaning.
- Use a cleaning agent suitable for plastic or a cloth dampened with water and soap.

Charging the battery

Before first use: The battery is not fully charged on delivery and should be charged before using the logger for the first time.

Charge the logger
- Before each use
- At least every six months

Procedure:

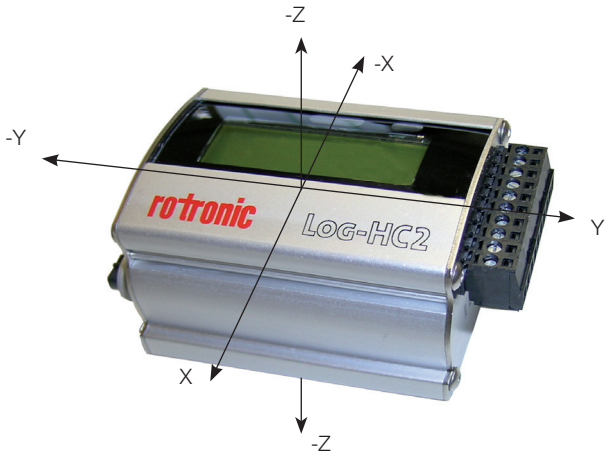
- Connect the logger to the power supply or via USB connection cable to the PC or an external USB mains adapter.

Notes:
- The meaning of the yellow warning light during charging is described on page 14.
- Charging an exhausted battery takes approx. 5 hours using the mains adapter. Charging is also possible via the USB port with the backlight turned off (approx. 28 hours).
- Recorded data is non-volatile and remains in the unit's memory even when the battery is exhausted.
- Never store the logger with a discharged battery. See ->18 (storage conditions).

Specifications

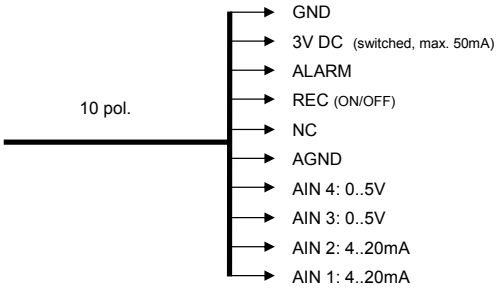
See data sheets

Defining the axes

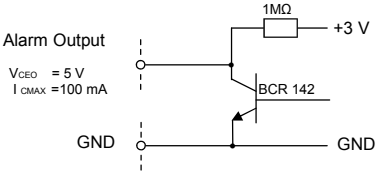


Terminal assignment (only LOG-HC2-RO1)

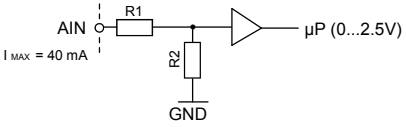
Pin Assignment:



Alarm: • Alarm Output

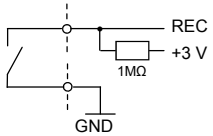


AIN1 ... AIN4: • Analog - Input (internal)



Input	R1	R2
4..20mA	0Ω	120Ω
0..5V	510kΩ	470kΩ

REC Start/Stop: • Record Start/Stop



GND: • Ground

Operating, transport and storage conditions

- Protect the logger from excessive exposure to the sun and other sources of heat. Avoid heavy impacts.
- Do not place heavy objects on top of the logger.
- Only store the logger in a dry, dust-free environment.

Operating conditions:

Temperature:	-20°C to +65 °C
Pressure:	500 mbar to 2500 mbar absolute
Humidity:	10-95 % relative humidity, non-condensing Avoid contact with water and humidity

Optimal storage and transportation conditions:

Temperature:	5 °C bis 45 °C (ideal storage condition for the battery)
Humidity:	10-95 % relative humidity, non-condensing Avoid contact with water and humidity
Battery charge level:	Never store the logger with a discharged battery. The ideal charge level is a 2/3 charge (see „Charging the battery“ on page 15)

Troubleshooting

Problem	Possible cause	Possible solution
The temperature increases continuously when the logger is connected to the mains adapter or the PC	The battery warms up because charging commences.	When making temperature measurements disconnect the logger from mains adapter or the PC.
The LOG PC programs do not recognise the connected logger	The COM port driver is not installed correctly.	Observe the manufacturer’s installation instructions. http://www.ftdichip.com/

Packing list

- LOG-HC2-RO1, or LOG-HC2-P1
- CD including:
  - User manual
  - Logger PC software
- Logger USB connection cable
- Mains adapter

Options:

- Additional sensors
- Adapter for connecting further sensors

Disposal

Take the logger and the mains adapter to a municipal waste disposal centre or return it to Rotronic. The logger and the mains adapter must not be disposed of in normal domestic waste.

PC software

Setup

Reader

Viewer

Online

PC software

Overview

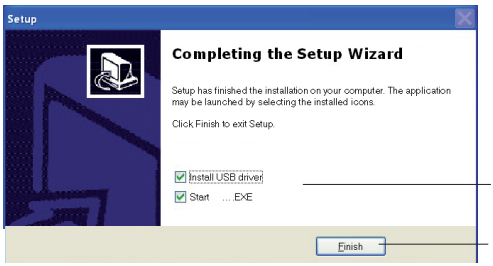
External processing of logger data is carried out using the LOG PC software programs Setup, Reader, Viewer and Online. The LOG PC programs can be used for all logger types.
The Setup enables the properties of the logger to be customised to user's requirements.
The Reader allows the user to transfer measurement parameters to a Windows PC. The Viewer is used to display data graphically or in table form or to export it as a text file (*.csv).
With the help of Online (and the built-in display) users can view measurement parameters and curves "live" on a PC.

Installation of the LOG PC software on a PC

For installation you will require Windows administrator rights.

Insert the CD containing the LOG PC software into the computer's CD-ROM drive. The installation procedure starts automatically*.

Completing installation


Setup
Completing the Setup Wizard
Setup has finished the installation on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Install USB driver
Start ....EXE
Finish

Initial installation: Select **Install USB driver**.

Click on **Finish**.

The logger symbol appears on screen.

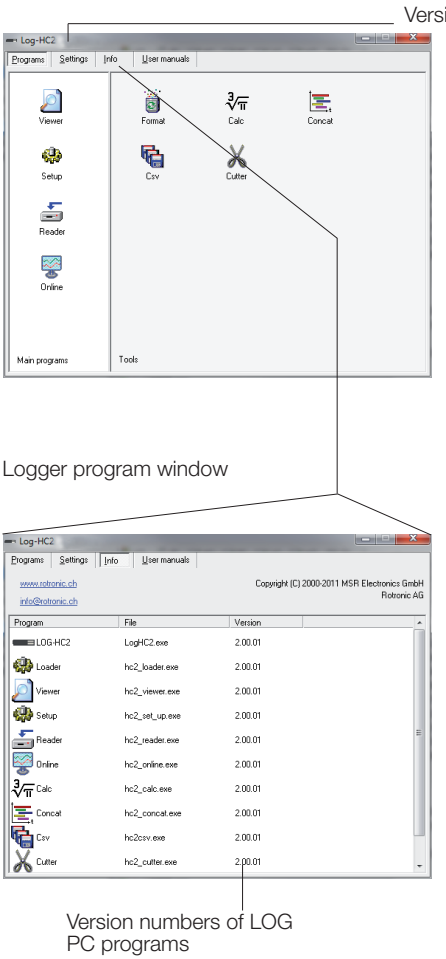
If the PC is not set up for automatic installation, proceed as follows:

1. Click **Start** > **Run**
2. Click **Find** > **Look in**: (set to CD drive).
3. Select the file **Install_LOG_HC2.exe** and **Open**.
4. In the **Run** dialog box click **OK**.
5. The installation process will begin.
6. Follow the instructions and select: **Run LOG-program** now.
7. During the initial installation select **Install USB driver**. See above, **Completing installation**.

* The program "Inno Setup" for installing the logger PC programs was written by Jordan Russell (www.jrsoftware.org, copyright Jordan Russell).

Starting the logger Software

The logger software may be started by clicking on the logger symbol or via **Start** > **Programs** > **LOG_HC2 X.XX.XX** (folder) > **LOG_HC2 X.XX.XX**. The logger program window appears:



Uninstalling

The software is uninstalled via the computer's operating system (Programs > LOG_HC2 > Uninstall LOG_HC2).

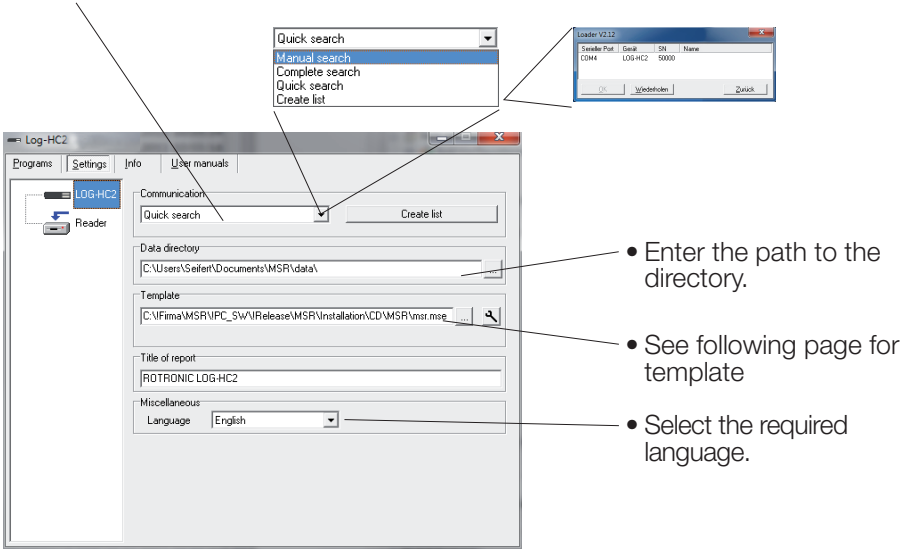
System Requirements

- Windows 2000 / XP / Vista / 7
- USB port

Preparation

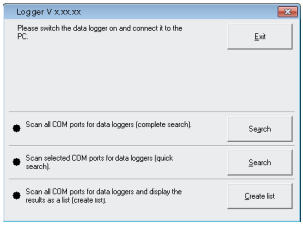
Before using the LOG PC programs **Setup**, **Reader** and **Online**, the following preparations must be completed:

- Use the USB connecting cable to connect the logger with the PC.
- Before first use: Using logger symbol open the logger program window, select **Settings** > **Logger**.
- Select the rule by which the **Setup**, **Reader** and **Online** programs are to search for the required logger*.



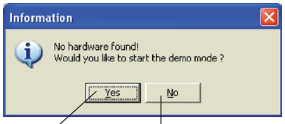
Logger program window

* One of the following windows will appear if a connection to a logger cannot be established using the current rule.


Logger V x.xx.xx
Please switch the data logger on and connect it to the PC.
Exit
Scan all COM ports for data loggers (complete search)
Search
Scan selected COM ports for data loggers (quick search)
Search
Scan all COM ports for data loggers and display the results as a list (create list).
Create list

Loader Dialog

During Setup:



Starts the Loader dialog (see screenshot left)

Starts the Setup demo mode

Template

The template, selected via **Setting** > **LOG-HC2** (*.mse), defines which sensors the **Reader** reads out as standard or are displayed in **Online**. The template sets the colour of the trace, the positioning of its axis (left, right) and gives the sensors a name (“HUM, T1” is required to be displayed as “outside temperature”, for example). Templates can be produced on the basis of examples contained in **Viewer** (->34).

Example

The temperature curves are required to be blue and oriented on the right hand axis in all display modes.

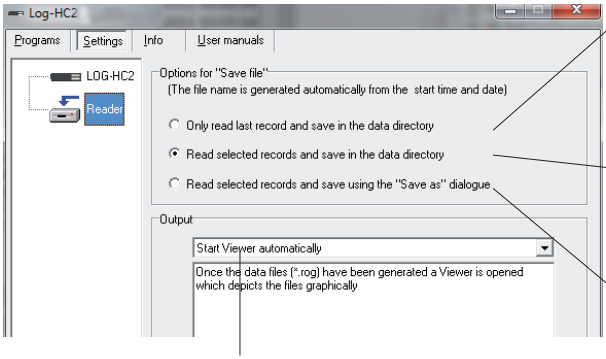
1. Assign right hand axis and blue colour shades to temperature in **Viewer**.
2. Save as template (Bluetemp.mse).
3. Generate new templates for **Reader** and **Online**: Select logger program window, **Settings LOG-HC2** > **Template** , enter new name and path (Temperature.mse), then **Open**.
4. Open the still blank template (Temperature.mse) using .
5. **Import** the template that was created in **Viewer** (Bluetemp.mse). Select the required sensors (tick in checkbox) in the **Module** column and confirm with **Accept**.
6. Edit the displayed list: First select a sensor in the Module column and then choose **Edit**.
7. Change the name “HUM, T1” to “Outside temperature”, and Accept.
8. Continue to make the necessary adjustments and confirm them with **Accept**.

Pre-adjustments - Reader

Enter the required options for the Reader** via Settings > Reader.

**Data records are transferred from the logger to a PC using the Reader.

Once data transfer is complete the Reader creates a data record (*.rog) from each logged record, names it and saves it in the corresponding directory. The bottom-most option allows the user to alter the suggested filename and location.


Log-HC2
Programs
Settings
Info
User manuals
LOG-HC2
Reader
Options for "Save file"
(The file name is generated automatically from the start time and date)
Only read last record and save in the data directory
Read selected records and save in the data directory
Read selected records and save using the "Save as" dialogue
Output
Start Viewer automatically
Once the data files (*.rog) have been generated a Viewer is opened which depicts the files graphically

Transfer only the most recent data record logged with the logger to the PC.

User defines which records are transferred to the PC

User defines which records are transferred to the PC, their filenames and their location.

Once the data has been transferred to the PC various options are available to the user. Details may be found in the text window.

Example: "Automatically generate a text file"
In addition to the logger format file, the **Reader** creates a text file (*.csv), which can be opened with programs such as e.g. Microsoft Word or Excel.

Completion of the preparatory measures

Upon exiting Settings the PC saves the settings that were last entered.

Once entry of the settings is complete, select Programs and start the required program.

Note: The following instructions assume that the preparations for using the LOG PC programs have been completed.

Setup

Setup is used to select the sensors for which the logger is required to save measurement parameters, to enter the measurement frequency and to set the behaviour of the logger's memory. In **Setup** you can also define the start time for data recording and stop data recording.

The following subjects are dealt with in the Setup chapter:

Basic settings 29
Prediction 30
Reducing the volume of data 31
Conditional recording of measurement parameters (limits) 31
Setting the alarm limit 31
LED behaviour 32
Transferring basic settings to several loggers 42

User settings 33
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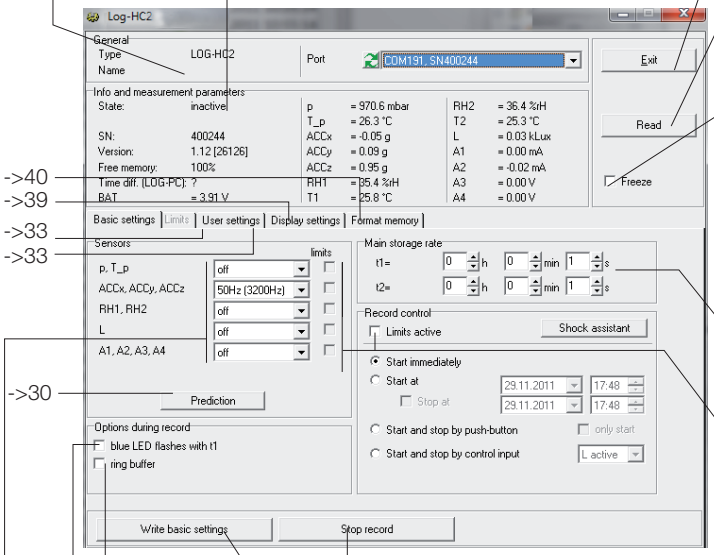
Formatting the memory 39

Basic settings

This page describes the most commonly used settings – the Basic settings. Information on further settings can be found on the following pages.

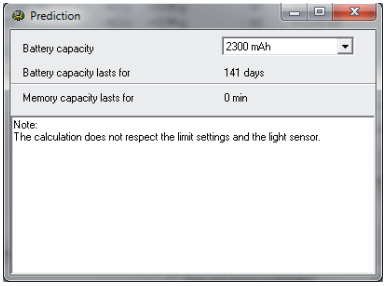
- Complete the preparations (->33).
- Start Setup (Setup symbol).
- Edit the **Basic settings** according to your requirements.
- Transfer the new configuration and the start conditions to the **logger** with **Write basic settings**.



Define the sensors from which the logger should record data, together with the storage rate.
The **50Hz (3200 Hz)** function is only available for the acceleration sensors (ACC).

50Hz (3200 Hz)
Acceleration values are measured at 3,200 Hz and saved at a frequency of approx. 50 Hz following digital filtration. Energy consumption increases for **50Hz (3200 Hz)** measurements.

Prediction



The maximum amount of data that can be recorded is influenced by:

- The number of sensors
- The measurement rate
- The battery capacity

With each click on **Prediction (Basic settings)** the program generates an approximate prediction using the selected basic settings.

Note: The Limit settings are not taken into account here.

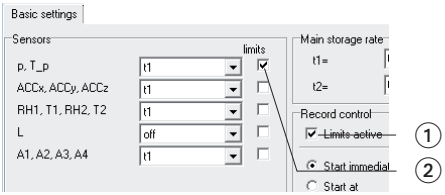
Reducing the volume of data

When making extensive recordings it is recommended that all sensors that are not required be “turned off”. This prevents unrequired measurement parameters from being saved.

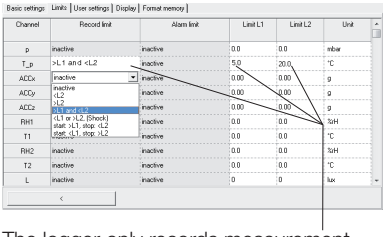
- Under **Basic settings** turn "off" all unused sensor groups (see next section).
- To turn off individual sensors within one sensor group proceed as follows: Set the cut-in condition such that they are not activated during the planned recording (e.g. > 200 °C) (see next section).

Conditional recording of measurement parameters (limits)

If for example, you require only to record temperatures above 5°C and less than 20 °C, use the following procedure:



- Activate **Limits active** ① and the corresponding temperature sensor ②.
- The Limits tab opens.



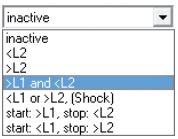
The logger only records measurement parameters from the sensor T(p) above 5°C and less than 20 °C

- In the columns **Record Limit**, **Limit L1** and **Limit L2** enter the cut-in conditions for the sensor.

- Return to the **Basic settings** with < and click **Write basic settings**. The limits will only be transferred to the logger with **Write basic settings**.

Setting the alarm limit

The logger can display an alarm if a certain measurement parameter drops below or exceeds a certain value. When the alarm condition occurs the red LED flashes once per second until the data recording is stopped.
Inputting the alarm condition is carried out in the same way as setting the cut-in conditions (see section Conditional recording of measurement parameters).



In the Alarm Limit, **Limit L1** and **Limit L2** columns enter the alarm conditions.
The alarm limits can be displayed in **Viewer**.

LED behaviour

The behaviour of the blue LED is defined via **Setup** > **Basic settings**.

		Options during record ☑ blue LED flashes with t1	Options during record ☐ blue LED flashes with t1
Situation		**Behaviour of the blue LED**	
Start time has been transferred to the logger	First 5 seconds	Double-flashes 5 times at 1-second intervals	
	Waiting for start	Double-flashes at 5-second intervals	
Data recording in progress	First 5 seconds	Flashes 5 times at 1-second intervals	
	After 5 seconds	LED flashes with main storage rate t1	LED does not flash

Transferring basic settings to several loggers

Use the following procedure to transfer basic settings that have already been input to several loggers:

- Start **Setup**.
- Connect the logger to the PC. (If several loggers are connected to the PC, select the COM port of the required logger)
- Enter the required values in the **Basic settings** tab.
- Set the cut-in and alarm conditions in the Limits tab.
- Use **Write basic settings** to transfer the basic settings to the logger.
- Disconnect the logger just configured and connect the next logger to the PC.
- Select the new logger via COM Port.
- **Caution!** If you wish to import the information and measurement parameters of the newly connected logger, you must first select the option **Freeze** ->24, so that the settings in the Basic settings and Limits tabs are not overwritten!
- Transfer the basic settings to the logger with **Write basic settings**.

Note:

- It is also possible to configure differently equipped loggers with a single basic setting. One logger may for example, not be equipped with any analogue inputs. The setup program then simply does not write any data to the settings saved in the logger for those analogue inputs.

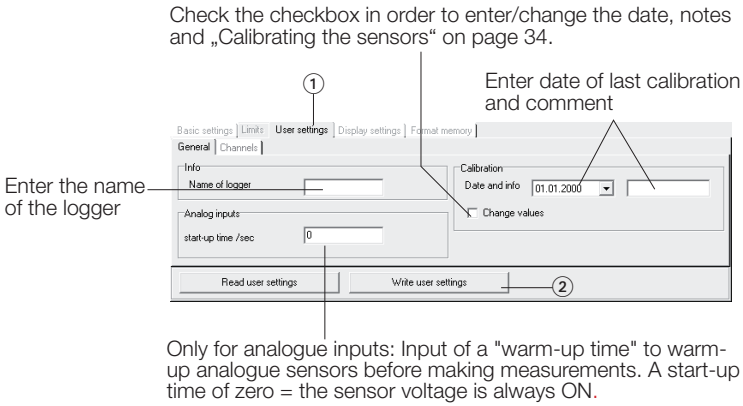
- If a connected logger deviates too greatly from the first logger, this message appears:

User settings

To display the configuration saved in the logger select the Basic settings tab ① and click **Read basic settings**. The settings are now displayed in the **User settings** tab.

CAUTION

The changes made in the **User settings** tab and its sub-menus will only be transferred to the logger after clicking **Write user settings** ②.



Adjusting the channel properties

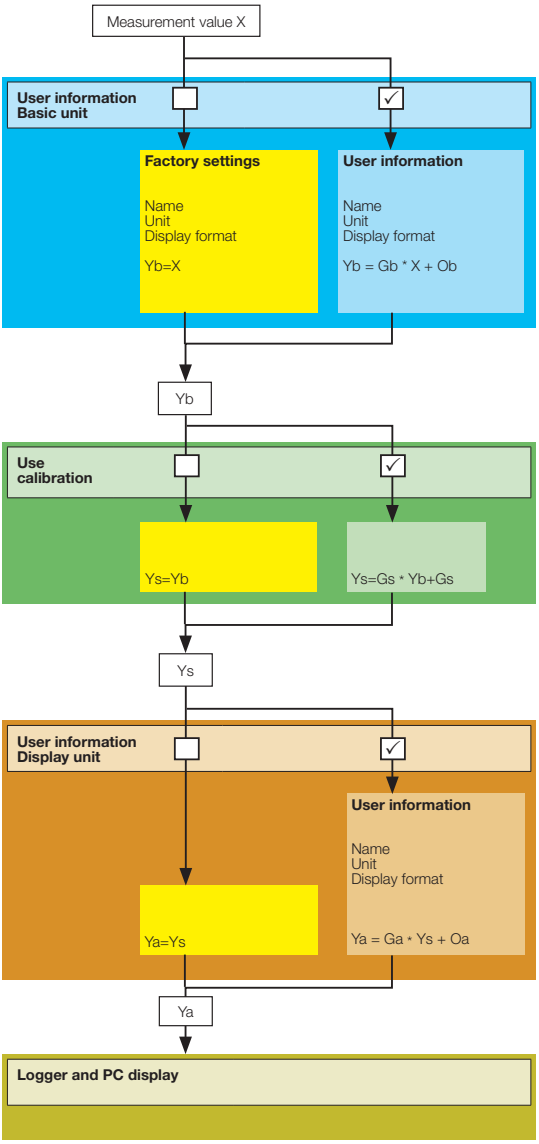
Select the tab **Channels** ③ in order to change the name, unit, display format and calibration of a channel.

The following options are available (see following schematic):

- **Change basic parameter** (see page 36)
  Changing the factory settings (name, unit, display format).
  This information is used for calibration purposes among others.

- **Calibration** (see page 37)
  Correction of the displayed values.

- **Change display parameter** (see page 38)
  Change the factory settings or the information entered under **Change basic parameter**.
  This information is used for the logger and PC display.



X Measurement value

Gb Base amplification

Ob Zero reference point

Yb Reference value

Yb Reference value

Px Calibration points (P1 and P2)

$Gs = (P2_{Setpoint\ value} - P1_{Setpoint\ value}) / (P2_{Actual\ value} - P1_{Actual\ value})$

$Os = P1_{Setpoint\ value} - Gs * P1_{Actual\ value}$

Ys Calibrated value

Ys Calibrated value

Ga Display gain

Oa Zero point display

Ya Display value

Change basic parameter

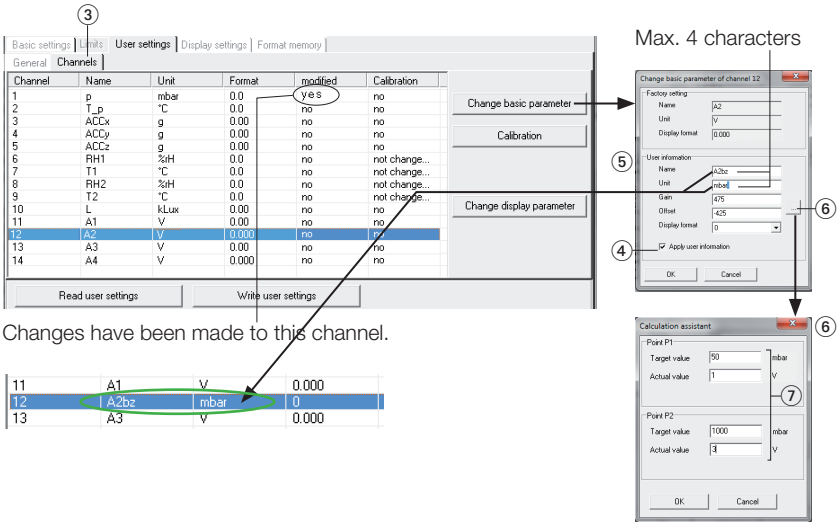
Change basic parameter is used to adapt the factory settings (name, unit, display format) to your requirements. These details are used among others, for **calibration** purposes.

Select the desired channel (e.g. analogue input A2) and then click **Change basic parameter**. Enter your adjustments ⑤ (e.g. Mbar instead of Volt).

To enter the conversion factor (e.g. Volts to Mbar) the following options are available:
- Enter the **amplification** and the **zero point**
- Using the calculation assistant ⑥ enter the values for points P1 and P2 ⑦. The program will then calculate the amplification and the zero point.

Activate **Apply user information** by checking the checkbox ④ and then click **OK**. Transfer the changes to the logger by clicking **Write user settings**.

Note: Should you wish to use a different display unit to that used for calibration, then please use the function **Change display parameter**.



Resetting channel properties to the factory settings:
Uncheck checkbox ④ (**Apply user information**) and transfer the changes to the logger by clicking **Write user settings**.

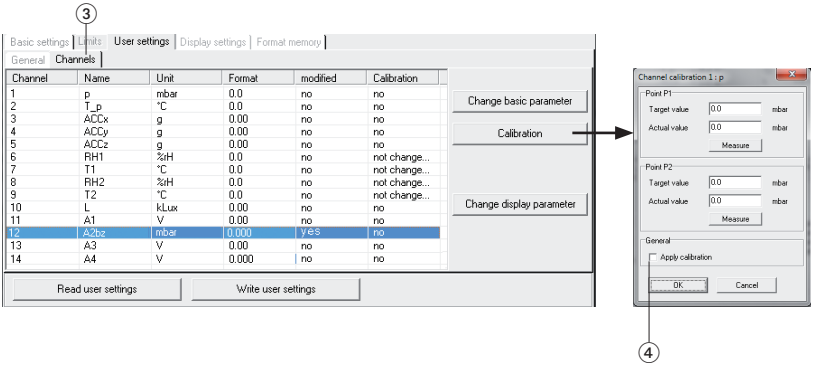
Calibrating the sensors

The sensors and analogue inputs can be calibrated using a 2 point calibration process. Those sensors marked “not changeable” in the **Calibration** column cannot be calibrated.

CAUTION

Calibration and adjustment of the HygroClip2 probe is carried out using the ROTRONIC HW4 software.

Select **User settings** and at the bottom click on **Read user settings**. Under **General** > **Calibration**, check the **Change values** checkbox.
Choose **Channel** ③.
Select a channel and then click **Calibration**.

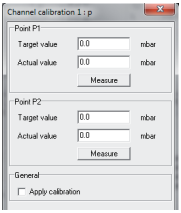


Calibration can be carried out a) manually or b) by measuring the signal and subsequently entering the target value.

a) Manual calibration

First enter the actual value and then the associated target value for points P1 and P2. Activate the completed calibration by checking the checkbox ④. Confirm your selection with **OK**.

b) Calibration using the measurement function



Apply the desired signal for point P1 and click **Measure**. The measured actual value is displayed. Enter the associated target value for point P1. Repeat this procedure for P2. Activate the completed calibration by checking the checkbox ④. Confirm your selection with **OK**.

Activate the completed calibration by checking the checkbox ④ and then click **OK**. If necessary, calibrate further sensors (channels). With **Write user settings** ② you can simultaneously transfer all of the completed calibrations to the logger.

Resetting the calibration to the factory defaults
Uncheck the checkbox ④ (Apply calibration) and transfer the change to the logger by clicking **Write user settings**.

> **CAUTION**
>
> If, following calibration, changes are made via „Changing the basic parameter“ on page 36, the performed calibration will be lost.

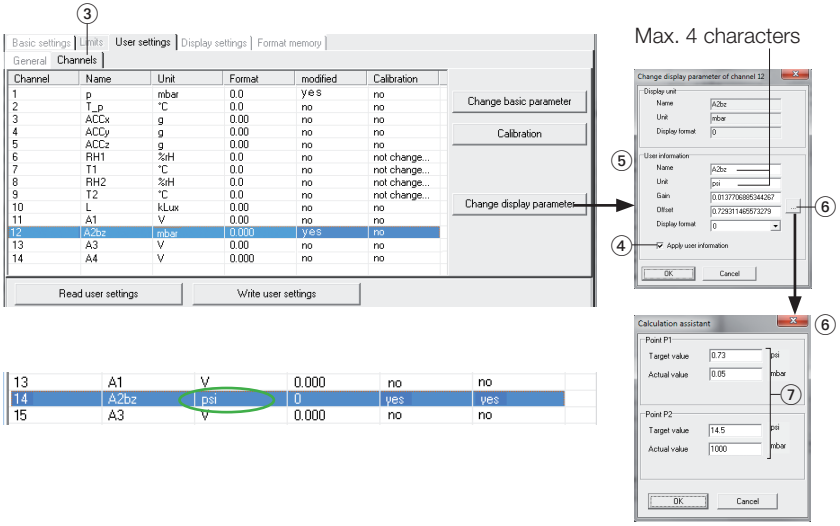
Changing the display parameter

Changes that are made with **Change display parameter** have no effect on the settings made with **Change basic parameter**. This allows you to always perform calibration using the units selected with **Change basic parameter**.

Select the desired channel (e.g. analogue input A2) and then click **Change display parameter**. Enter your adjustments ⑤ (e.g. psi instead of Mbar).

To enter the conversion factor (e.g. Mbar to psi) the following options are available:
- Enter the **amplification** and the **zero point**
- Using the calculation assistant ⑥ enter the values for points P1 and P2 ⑦. The program will then calculate the amplification and the zero point.

Activate “Apply user information” by checking the checkbox ④ and then click **OK**. Transfer the changes to the logger by clicking **Write user settings**.

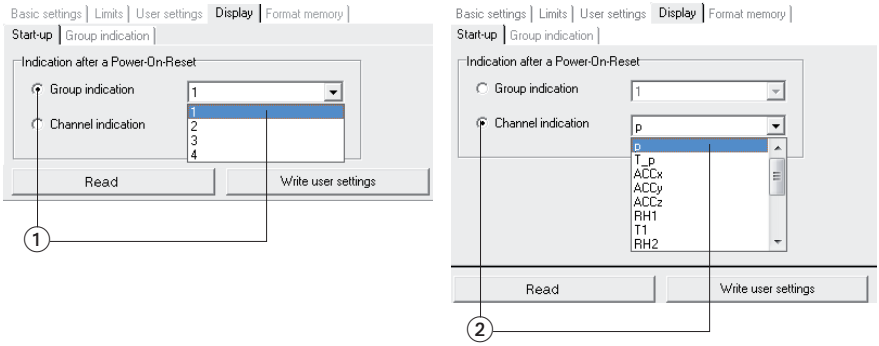


Resetting the properties to the factory settings:
Uncheck checkbox ④ (**Apply user information**) and transfer the changes to the logger by clicking **Write user settings** ②.

Defining the logger display

Select **Display** and then click **Read user settings** at the bottom.

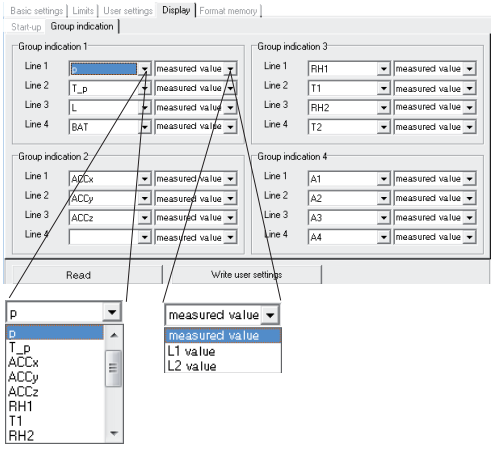
Define what the device should display following a power-on-reset under **Start-up**. A group of measurement parameters ① defined under **Group indication**, or a single channel ② can be displayed.



Transfer the desired settings to the device by clicking **Write user settings**.

Defining the group indication

Define which channels should be displayed together in one group indication under **Display** > **Group indication**. 4 group indications each with 4 channels can be shown. For each channel, the measurement parameter, limit L1 or limit L2 can be displayed.



Transfer the desired settings to the device by clicking **Write user settings**.

Open group indication on the device: See „Logger display and logger operation“ on page 13.

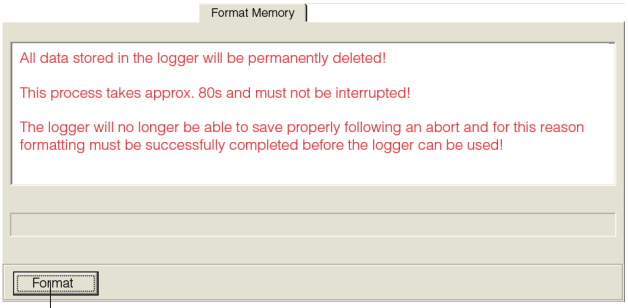
Formatting the memory

CAUTION

Formtting will erase all measurement parameters saved in the logger!

Formatting is used to delete all the measurement parameters saved in the logger.

Formatting the logger is carried out from the **Format memory** tab.


Format Memory
All data stored in the logger will be permanently deleted!
This process takes approx. 80s and must not be interrupted!
The logger will no longer be able to save properly following an abort and for this reason formatting must be successfully completed before the logger can be used!
Format

Deletes all measurement parameters saved in the logger

Reader

With the **Reader** users can selectively transfer data records logged with the logger to a PC. It does however free measurement records that have already been read out for overwriting.

Transferring data records to a PC

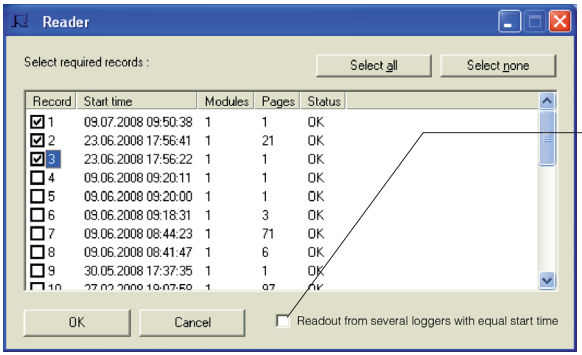
- Complete the preparations (->24) aus.
- Start the **Reader** (Reader symbol)

CAUTION	Once data transfer has started (Start) all data records saved on the logger can be overwritten if required, even if the circular buffer is deactivated in Setup.

- Begin data transfer with Start.

The options selected under **Settings** > **Reader** (->26) influence the next steps:

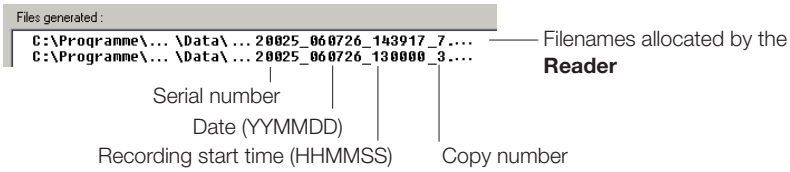
- Under the option **Read selected records** the following data entry dialog box appears:



- Select the data records to be transferred.
- Click **OK.**
- Data records having the same start time are written together to one file.

- With the option **Read selected records and save with "Save dialog as"** under **Settings** > **Reader** (->26) the filenames and locations suggested by **Reader** can be overwritten.

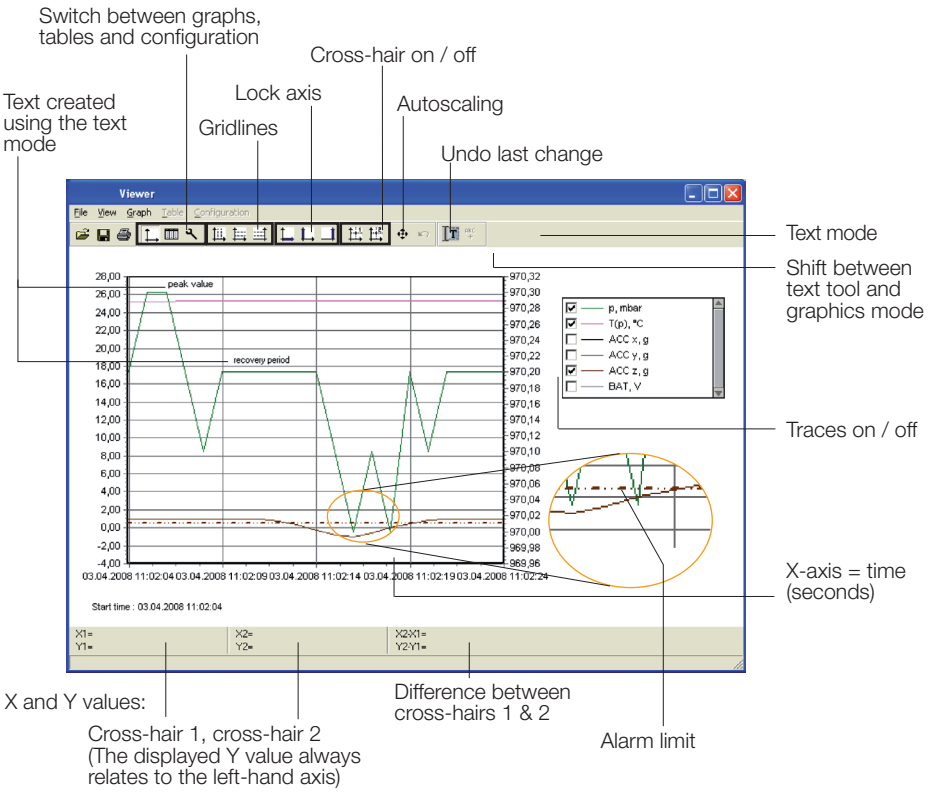
Once the data records have been saved on the PC a list of files created appears.

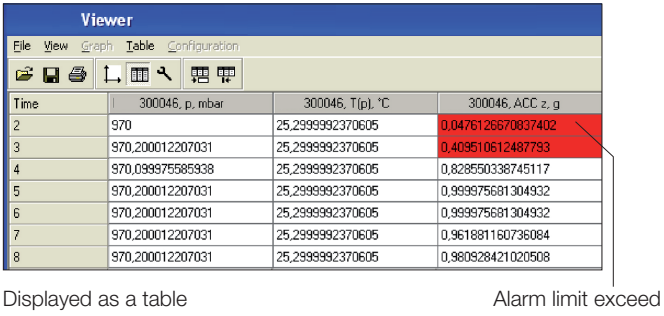


Viewer

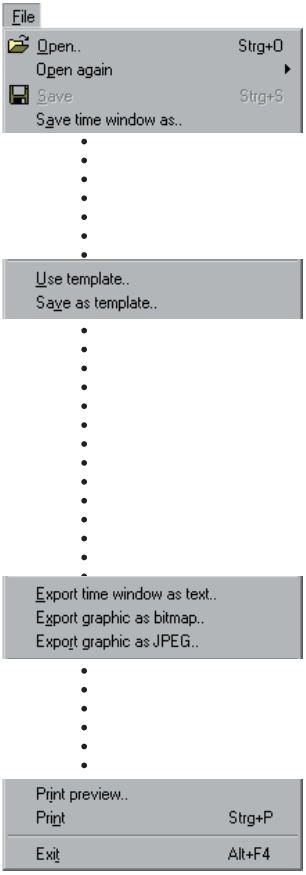
Records created in **Reader** or **Online** may be viewed and edited on a PC with the **Viewer**. The measurement parameters may be displayed either in graph or in table form.

- Start the **Viewer** (Viewer symbol).
- Open a record (*.rog) via **File** > **Open**.





Move traces		With right mouse button held down
Enlarge section		Mark the required section with the left mouse button held down. See also **Graphics** > **Fixed** axis).
Cross-hair	Move axis: Move centre:	Grab the axis, move with left mouse button. Grab the centre, move with left mouse button.



File

The **File** menu is used to **Open** records, to Reopen (**Open again**) the most recently used records and to **Save** the currently open record as displayed.

With **Save time window as** the measurement parameters of the displayed time window are saved. (The measurement parameters of the hidden traces are also saved). For further options see **Cutter** ->44.

Templates help to standardise the displays, enable easy repetition when reselecting the same sensors and the same printing format.

Creating templates: Adjust the display with **Graph** and **Configuration** and save via **File** > **Save as template** (file type: *.mse).

Apply a template to the displayed record:
File > **Use template** then select the required template (*mse).

Export Time window as text exports the measurement parameters of the displayed time window in *.csv format. The measurement parameters of the hidden traces are also exported.

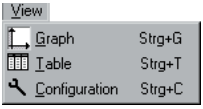
The trace can be exported in **Bitmap** (*. bmp) or as **JPEG** forma.

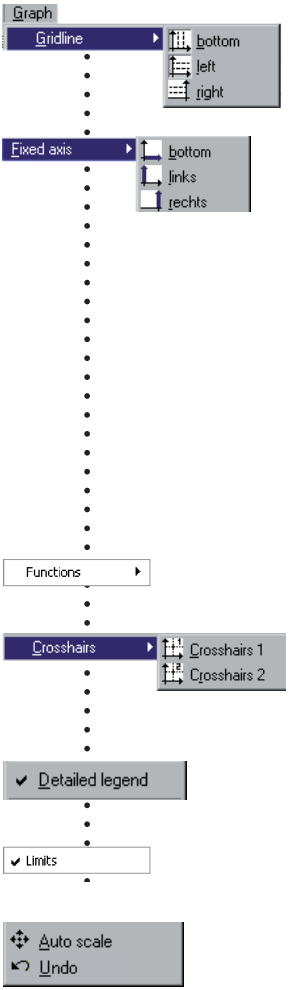
Print preview opens a preview of the trace/graph.

Print opens the print dialog box.

Exit closes the **Viewer**. If changes were made the user is asked whether the changes should be saved.

Note:
The program saves changes as “Template” (*.mse). The template is automatically saved in the record’s directory. Template (*.mse) and record (*.rog) have the same name.
Upon **Open**ing a record the **Viewer** searches for the template associated with that record. Should the template not be located in the same directory as the record then the standard format will be opened.





Graph

Gridlines can be shown for each axis (bottom, left, right).

Fixed axis simplifies the amount of detail shown within a time window or range of values.

- Select the required section with the left mouse button held down. The section is displayed enlarged.
- For closer viewing, lock the time window ( ) or range of values to the left or right axis (/). Several axes can be locked.
- With the left mouse button held down, select the required detail. The enlargement is displayed without altering the time segment or range of values of the locked axes.

A further click releases the lock.
Auto scal clears all locked axes.

Calculation functions

Using the two **Crosshairs** values can be measured on the X and Y traces. X and Y differences can be evaluated with the second cross-hair. The Y values displayed are always associated with the left axis.

With **Detailed legend** traces can be turned on and off in the list of sensors.

If available: Display of the alarm limits (see ->42).

The complete record is displayed by selecting **Auto scale** .
Auto scale clears all locked axes.

Undo undoes the last enlargement. As long as the **Configuration** dialog is not quitted, **Undo** allows the last changes made to the displayed configuration screen to be undone.

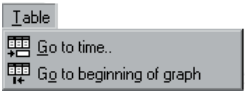


Table (Tabelle)
Go to time allows users to jump straight to the line in the table with the required time.

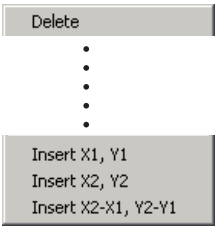
Jump to beginning of graph causes the table to jump to the first measurement values displayed in the graph.

Configuration
As long as the **Configuration** dialog is not quitted, **Undo** allows the last changes made to the configuration screen to be undone.

Text mode
Using the text mode you can insert texts at any place.
By clicking on you can activate and deactivate the text mode.

Insert text:

- Click on . The viewer displays "Text 1" in the upper left corner.
- Drag the text field to the desired place.
- Double click on the text field and enter your required text.



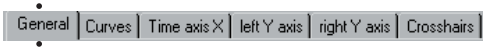
Delete text:

- Click with the right mouse button on the text field and select **Delete**.

Text field with X and Y values:

- place the crosshairs on your chosen position to adoddopt the X and Y values you would like to use in the text field.
- Create a text field (see above) and click on the right mouse button. Select the desired representation.

Configuration allows the display method of the measurement parameters to be set with the help of the configuration screens.



General

Entering title and footer information is achieved via **Configuration** > **General**.

Curves

The associated sensor name, assignment to the left or right axis, the colour, line weight and style can be set for each curve.

Axis > **inactive** allows the graph curve to be shown or hidden as required.

CAUTION

Depiction of the curves using dots (**Configuration** > **Curves** > **Dot**: **Yes**) requires more computing power, possibly leading to problems.

Time axis X
left Y axis
right Y axis

Using **Configuration** >**Time axis X**, the time axis can be annotated, the time segment to be displayed can be set, and the Increment for the lettering and ruled lines, together with the **Format** for numbers can be entered.
Automatic axis annotation with an **Increment** of 0 (zero).

Crosshairs

The number **Format** for the displayed X and Y values is entered via **Configuration** > **Crosshairs**.
The displayed Y value always relates to the left axis.

Undo the last changes

As long as **Configuration** is not quitted, users can undo the last changes made to the displayed configuration screen with .

Quit **Configuration**

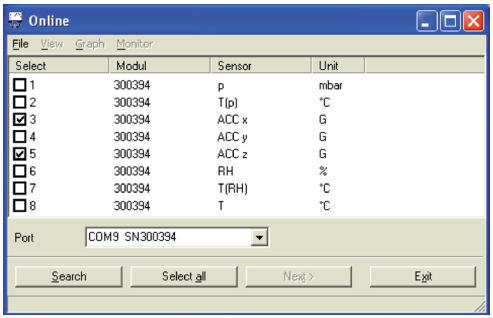
Quit **Configuration** via **Graph** or **Table** . Upon quitting, the **Viewer** saves the configuration.

Online

Online allows users to view the progress of the measurement parameters directly on-screen.

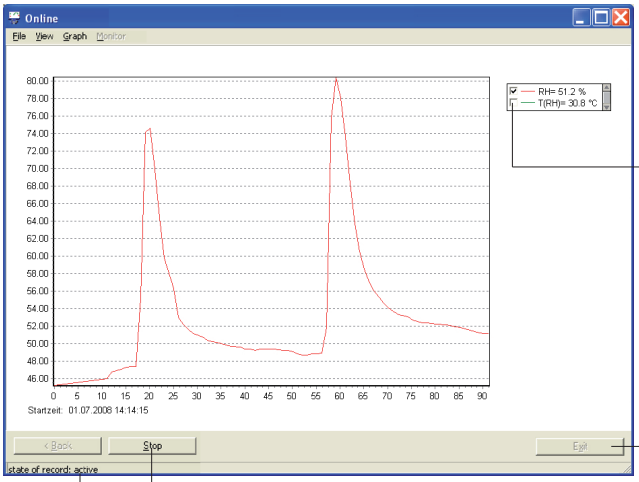
Procedure:

- Complete the preparations ->24.
- Start **Online** (Online symbol)



- Select the sensors that you wish to display.
- Click on **Next**.

- Online displays the measurement parameters graphically and numerically.

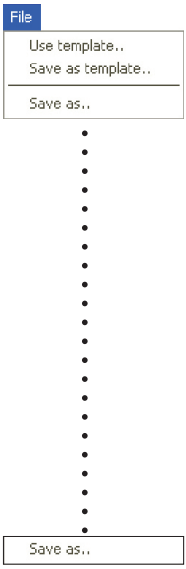


Turn trace on and off

Exits **Online**

Stop: A display
Continue: Continue

The logger is currently recording measurement parameters

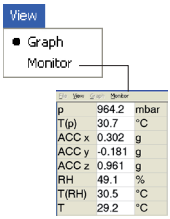


For recurring applications in **Online**, **Templates** assist in selecting the required sensors and adjusting the display to suit.

Create template: Start **Online** and select the required sensors. Select **Next**>. Use
Graph > **Properties**,
Graph > **Grid line**,
Graph > **Legend** and
Graph > **Start time to change the way the curve is displayed**. Via **Back** return to the trace display. Interrupt recording with **Stop**. Save the template via **File** > **Save as template**.

Apply the template to Online: **File** > **Use template** and select the required template (*mse).

Once recording has finished by clicking on **Stop**, the recorded measurement parameters can be saved via **File** > **Save as**.



In the menu **View** the measurement parameters can be displayed as curves with **Graph** or as numerical values with **Monitor**. The font displayed on the monitor can be selected via the menu **Monitor** > **Font**.

Once recording has finished by clicking on **Stop**, the recorded measurement parameters and traces can be deleted via **Clear**.

The display can be changed via **Properties**, **Gridlines**, **Legend** and **Start time**.

Select the frequency (**Refresh rate**) with which measurement parameters are to be transferred to the PC.

In the **Time window** you can define the time period represented by the time axis.

Utility programs

CSV

Cutter

Calc

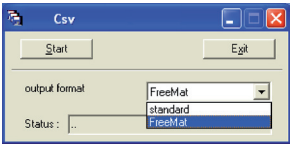
Concat

CSV

The **CSV** utility creates text files (*.csv or * .fmc) from data records (*.rog). Files saved in *.csv format can subsequently be opened and edited in a word processing or spreadsheet application. The *.fmc files can be transferred to FreeMat1.

Creating a text file

- Start CSV (**Logger Program window** > Tools > Csv).



- Select the output format (standard *.csv or FreeMat * .fmc)
- Click on **Start** and select the data record from which the text file is to be created. **CSV** creates a text file (*.csv) and saves it in the corresponding directory for that data record. Text file (*.csv) and data record (*.rog) have the same name.

Note on creating *.csv files: If a template (*.mse) exists for the data record in question, **CSV** takes this into account when creating the text file (*.csv).

Example: Opening a CSV text file with Excel

- Start the word-processing or spreadsheet program.
- Open the CSV file via **File** > **Open**.
- Under **File type**, select **Text Files**

	A	B	C	D	E	F
1	*CREATOR					
2	... _cutter.ex	[V1.20]				
3	... 2csv.exe	[V1.28]				
4						
5	*					
6	Name	Pilatus				
7	SN	20025				
8	Revision	0				
9						
10	*STARTTIME					
11	31.07.2006	17:14:00				
12						
13	*MODUL					
14	NAME	20025	20025	20025	20025	20025
15	ID	[C102 V1.22]	[C102 V1.22]	[C102 V1.22]	[C102 V1.22]	[C102 V1.22]
16						
17	*TIMEDELAY					
18	s	0.3	0.3	0.3	0.3	0.3
19						
20	*CHANNEL					
21	TIME	T	RH	T(RH)	ACC x	ACC y
22						
23	*UNIT					
24	s	°C	%	°C	g	g
25						
26	*DATA					
27	31.07.2006 1:	28.875	48.8699989	28.3799992	-1.01199996	0.27599999
28	31.07.2006 1:	28.875	48.9300003	28.3899994	-1.01199996	0.27599999
29	31.07.2006 1:	28.875	48.9300003	28.3899994	-1.01199996	0.26800001
30	31.07.2006 1:	28.875	48.9700012	28.4099998	-1.01199996	0.26800001

Data source

Logger name

Serial number

Logger revision number

Record start time: Date (Day.Month.Year) and time of day (Hr:Min:Sec)

Modules for which measurement parameters were recorded

Module version

Time difference between PC time and Logger time (readout time)

Channel and sensor names

Unit for the displayed value

Measured parameters (data) in chronological order

Excel file with measured data

Time of recording

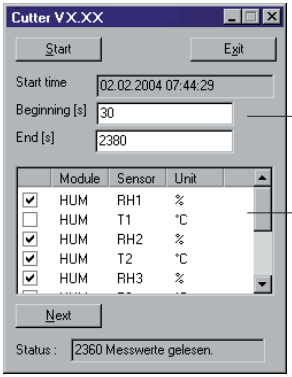
[1] Further details on FreeMat can be found in the section **FreeMat** ->59

Cutter

The **Cutter** utility creates an extract from a data record (*.rog).

Creating an extract from a data record

- Start the **Cutter** utility (**Logger Program window** > **Tool** > **Cutter**)



- Click on **Start** and select the data record from which the extract is to be created.
- Select the time window. **Beginning** / **End**.
- Select the sensors for which the measurement parameters are to be exported to a new data record and click **Next**.
- Enter the name and directory for the new data record. Click on **Save**.

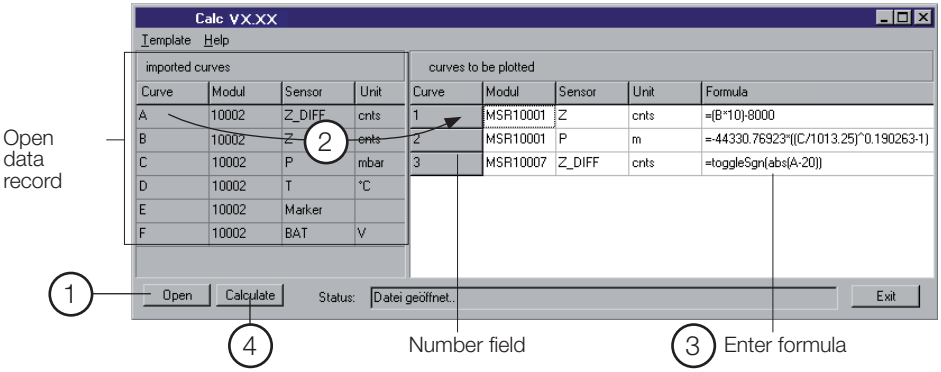
Calc

With **Calc** curves from existing data records can be linked to each other using formulae and saved as a data record (*.rog). The saved data record can be displayed and processed in the form of curves or as a table using the Viewer. Templates simplify the processing of recurring tasks.

Note: For making comprehensive calculations the FreeMat math software is available (see ->59).

Computing new curves

• Start **Calc** (**Logger program window** > **Tools** > **Calc**)



1 **Open data record (data origin)**
Click on **Open** to open the data record for which you want to perform calculations on the curve. It is possible to open multiple data records.

2 **Create new curves**
From **imported curves** select the curve that you want to use for your calculations and drag it – with the left mouse button pressed – to the right into the field for curves to be plotted. Repeat this procedure until the required number of curves is shown on the right.

3 **Enter formula**
Enter the formula to be used for the new curve into the **Formula** column. For this, use the capital letters on the left.
Example for a subtraction: A-C

You will find a list of the available functions at the end of this section or under **Help**.

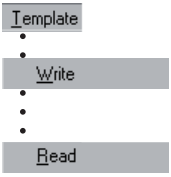
Modify the text for the new curves
The entries in the columns **Module**, **Sensor** and **Unit** can be modified.

Modify the order of the new curves
With the left mouse button pressed, drag the number field to the required position.

Delete new curves
Click inside the number field of the curve to be deleted and then press the delete key. Via **Template** > **Delete plotted curve**, all new curves can be simultaneously deleted.

4 **Calculating and saving the new curves**
Click on **Calculate** then enter the name and set the directory for the new data record. Click on **Save**.

Note: The curves are saved as data records (*.mrs). The saved measurement parameters can be displayed and processed as a curve or as a table by the Viewer. Intermediate values are interpolated.
Only curves that overlap timewise can be calculated.



Creating a template for processing recurring tasks
Once you have created the new curves you can save their labels and formulae as a template (*.mse). (**Template** > **Write**).

Creating new curves using templates
Open the required template (*mse) via **Template** > **Read**. This will automatically generate a number of new curves.
Multiple templates may be used to generate new curves. Each template generates a number of new curves.

Operators / brackets

+ - * / ^	Plus, minus, multiply, divide, to the power of
( )	Open brackets, close brackets

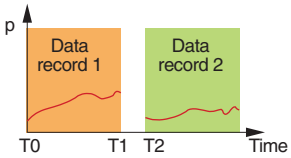
Functions

sqrt(no.)	Square root of the number
ln(no.)	Natural logarithm of the number (base e)
exp(no.)	Raise basis e to the power of the number
abs(no.)	Absolute value of the number
sgn(no.)	no. >0: sgn = 1 no. =0: sgn = 0 no. <0: sgn = -1
cos(no.)	Cosine of the number
sin(no.)	Sine of the number
tan(no.)	Tangent of the number
ctg(no.)	Cotangent of the number
arcsin(no.)	Arc sine of the number
arccos(no.)	Arc cosine of the number
arctan(no.)	Arc tangent of the number
arcctan(no.)	Arc cotangent of the number
sinh(no.)	Hyperbolic sine of the number
cosh(no.)	Hyperbolic cosine of the number
tangh(no.)	Hyperbolic tangent of the number
ctgh(no.)	Hyperbolic cotangent of the number
toggleSgn(no.)	Changes every second measurement parameter sign (plus/minus)

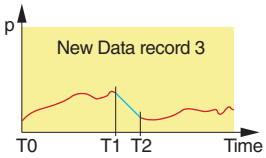
Further functions on request

Concat

With **Concat** (concatenate = to link) data records can be linked together and saved as a new data record (*.rog). The newly created data record can be displayed and processed in the form of curves or as a table using the Viewer.



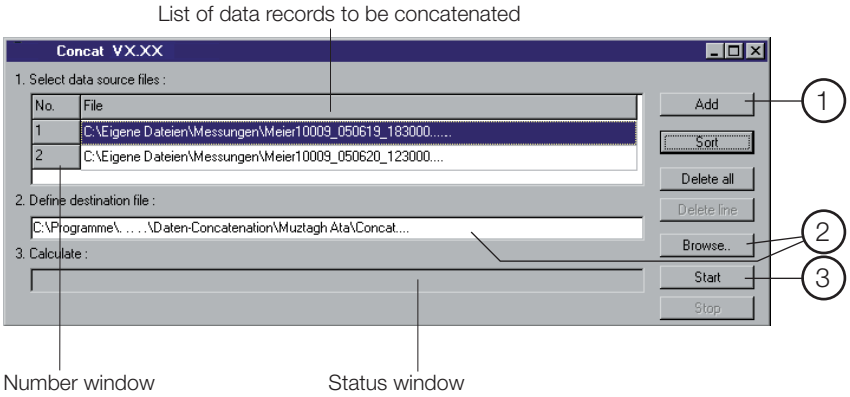
Before concatenation



After concatenation

Concatenating several data records

Start **Concat** (**Logger program window** > **Tools** > **Concat**)



(1) **Select the data records to be concatenated**
Open the data records that you want to concatenate by clicking **Add**. Note that the list must be in chronological order such that the oldest data record is at the top. Therefore either open the oldest data record first or sort the list afterwards (see below).

Sort the list alphabetically
Use **Sort** to sort the list alphabetically.
Data records that have automatically generated filenames (->41) can be chronologically sorted using **Sort**.

Modify the data record order
With the left mouse button pressed, drag the number field to the required position.

Delete all data records from the list
Use Delete all to remove all data records from the list.

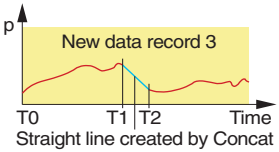
Delete one data record from the list
Select the data record to be deleted and click Delete line.

(2) **Enter the name and directory for the new data record**
Set the path to the directory using Browse and enter the filename, or use the input window to do this.

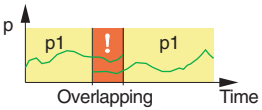
(3) **Calculating the new data record**
Start the calculation process with Start. Cancel the calculation with Stop.

Note:

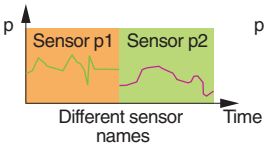
- Concat creates a straight line between the last data record of the first curve (T1) and the first data record of the second curve (T2).

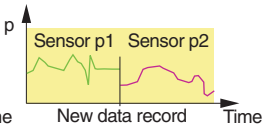


- If, for the data records to be concatenated, there are curves that overlap timewise and these have the same name (same module and sensor names with the same units), the calculation will be aborted and a corresponding message* will appear in the status window.

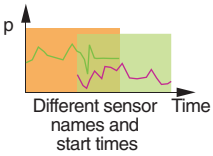


- If the module names, sensor names or units of the curves to be concatenated do not correspond Concat will be unable to join the curves and will create two curves.**

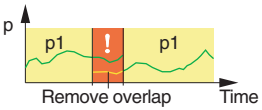




- With Concat you can superimpose curves with different module or sensor names.



* **Remove overlap**
Use the Cut utility to create an excerpt from a data record that does not overlap timewise with the next data record.



** **Modify module names, sensor names and units**
Use the Calc utility to match the module names, sensor names and units for the curves.

Additional software for PCs

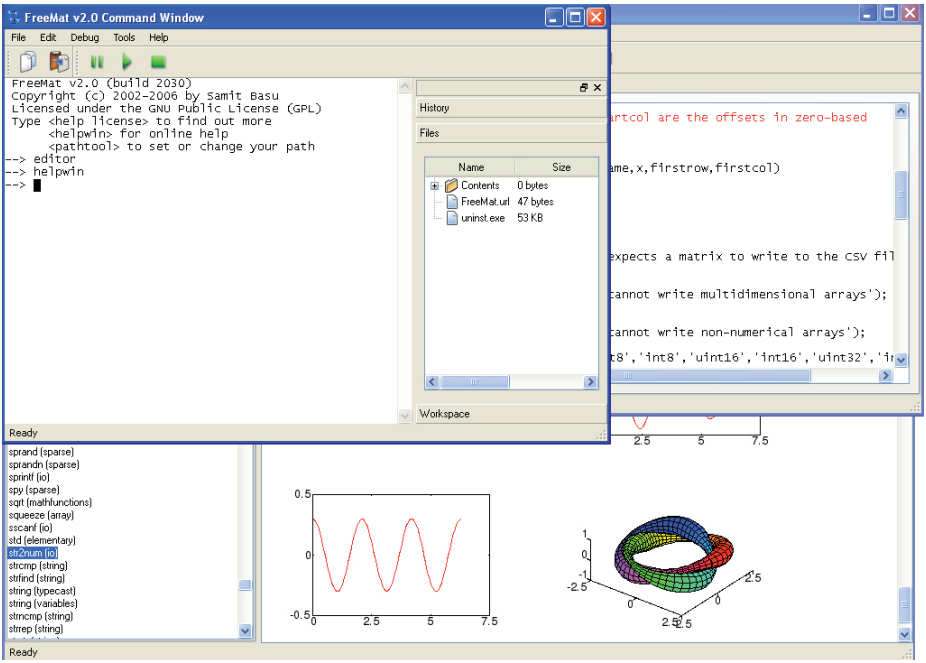
FreeMat

FreeMat

FreeMat is open source math software that can be installed from the logger CD (ADDITIONAL\FREEMAT). FreeMat can be used to carry out a wide variety of calculations.

How are data records transferred to FreeMat?
The Reader transfers the data recorded with the logger (records) to the PC. From these data records (*.rog) CSV creates FreeMat files (*.fmc). Using the scripts included these can be opened and edited in FreeMat.

More information on FreeMat can be found at
http://freemat.sourceforge.net/index.html.



The following FreeMat scripts can be found on the logger CD under ADDITIONAL\FREEMAT\MSCRIPTS:

plotmsr.m	Imports *.fmc files into the FreeMat environment and presents the data records graphically.
loadmsr.m	Imports *.fmc files into the FreeMat environment.

CE

11.2012

LOG-HC2 Firmware	V1.12
LOG-HC2 PC-Software	V2.00